

FORM PTO-1390 U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE TRANSMITTAL LETTER TO THE UNITED STATES DESIGNED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371		ATTORNEY'S DOCKET NO. PHDE 000004
		U.S. Application No. (if known, see 37 CFR 1.5) 09/831930
INTERNATIONAL APPLICATION NO. PCT/EP00/09197	INTERNATIONAL FILING DATE September 18, 2000	PRIORITY DATE CLAIMED September 18, 1999
TITLE OF INVENTION NETWORK CONNECTION		
APPLICANT(S) FOR DO/EO/US Matthias Wendt; Wolfgang Budde; Peter Fuhrmann		
Applicant(s) herewith submit to the United States Designated/Elected Office (DO/EO/US) the following items and other information:		
<p>1. <input checked="" type="checkbox"/> This is a FIRST submission of items concerning a filing under 35 U.S.C. 371.</p> <p>2. <input type="checkbox"/> This is a SECOND or SUBSEQUENT submission of items concerning a filing under 35 U.S.C. 371.</p> <p>3. <input type="checkbox"/> This express request to begin national examination procedures (35 U.S.C. 371(f)) at any time rather than delay examination until the expiration of the applicable time limit set in 35 U.S.C. 371(b) and PCT Articles 22 and 39(1).</p> <p>4. <input type="checkbox"/> A proper Demand for International Preliminary Examination was made by the 19th month from the earliest claimed priority date.</p> <p>5. <input type="checkbox"/> copy of the International Application as filed (35 U.S.C. 371 (c)(2)) a. <input type="checkbox"/> is transmitted herewith (required only if not transmitted by the International Bureau). b. <input type="checkbox"/> has been transmitted by the International Bureau. c. <input type="checkbox"/> is not required, as the application was filed in the United States Receiving Office (RO/US).</p> <p>6. <input checked="" type="checkbox"/> A translation of the International Application into English (35 U.S.C. 371(c)(2))</p> <p>7. <input type="checkbox"/> Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3)) a. <input type="checkbox"/> are transmitted herewith (required only if not transmitted by the International Bureau). b. <input type="checkbox"/> have been transmitted by the International Bureau. c. <input type="checkbox"/> have not been made; however, the time limit for making such amendments has NOT expired. d. <input type="checkbox"/> have not been made and will not be made.</p> <p>8. <input type="checkbox"/> A translation of the amendment to the claims under PCT Article 19 (35 U.S.C. 371 (c)(3)).</p> <p>9. <input checked="" type="checkbox"/> An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).</p> <p>10. <input type="checkbox"/> A translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).</p>		
Items 11. to 16. below concern document(s) or information included:		
<p>11. <input type="checkbox"/> An Information Disclosure Statement under 37 C.F.R. 1.97 and 1.98.</p> <p>12. <input checked="" type="checkbox"/> An assignment document for recording. A separate cover sheet is compliance with 37 C.F.R. 3.28 and 3.31 is included.</p> <p>13. <input type="checkbox"/> A FIRST preliminary amendment. <input type="checkbox"/> A SECOND OR SUBSEQUENT preliminary amendment.</p> <p>14. <input type="checkbox"/> A substitute specification.</p> <p>15. <input type="checkbox"/> A change of power of attorney and/or address letter.</p> <p>16. <input checked="" type="checkbox"/> Other items or information: _3_ Sheets of Drawings <input checked="" type="checkbox"/> Authorization Pursuant to 37 CFR § 1.136(a)(3) and to Charge Deposit Account</p>		

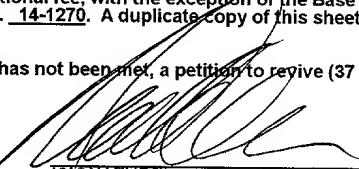
CERTIFICATE OF MAILING

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I hereby certify that this paper and fee is being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 CFR 1.10 on the date indicated above and is addressed to the Commissioner of Patents and Trademarks, Washington, D.C. 20231.

Elissa DeLucy
 Typed Name

Elissa DeLucy
 Signature

U.S. APPLICATION NO. (If known, see 37 C.F.R. 1.5) 097831930	INTERNATIONAL APPLICATION NO. PCT/EP00/09197	ATTORNEY'S DOCKET NUMBER PHDE000004		
17 [X] The following fees are submitted: BASIC NATIONAL FEE (37 C.F.R. 1.492(A)(1)-(5)):		CALCULATIONS (PTO USE ONLY)		
Search Report has been prepared by the EPO or JPO \$860.00 International preliminary-examination fee paid to USPTO (37 C.F.R. 1.482) \$690.00 No international preliminary examination fee paid to USPTO (37 C.F.R. 1.482) but international search fee paid to USPTO (37 C.F.R. 1.445(a)(2)) \$750.00 Neither international preliminary examination fee (37 C.F.R. 1.482) nor international search fee (37 C.F.R. 1.445(a)(2)) paid to USPTO \$970.00 International preliminary examination fee paid to USPTO (37 C.F.R. 1.482) and all claims satisfied provisions of PCT Article 33(2)-(4) \$ 96.00				
ENTER APPROPRIATE BASIC FEE AMOUNT =		\$ 860.00		
Surcharge of \$130.00 for furnishing the oath or declaration later than [] 20 [] 30 months from the earliest claimed priority date (37 C.F.R. 1.492(e)).		\$		
CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE	
Total Claims	11 - 20 =		X \$ 18.00	\$
Independent claims	3 - 3 =		X \$ 80.00	\$
MULTIPLE DEPENDENT CLAIMS (if applicable)			+ \$270.00	\$ 270.00
TOTAL OF ABOVE CALCULATIONS		=	\$1,130.00	
Reductions by 1/2 for filing by small entity, if applicable. Verified Small Entity Statement must also be filed (Note 37 C.F.R. 1.9, 1.27, 1.28)			\$	
SUBTOTAL		=	\$1,130.00	
Processing fee of \$130.00 for furnishing the English translation later than [] 20 [] 30 months from the earliest claimed priority date (37 C.F.R. 1.492(f)).		+ \$		
TOTAL NATIONAL FEE		=	\$1,130.00	
Fee for recording the enclosed assignment (37 C.F.R. 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 C.F.R. 3.28,3.31). \$40.00 per property		+ \$ 40.00		
TOTAL FEES ENCLOSED		=	\$1,170.00	
		Amount to be refunded	\$	
		charged	\$	
a. [] A check in the amount \$ _____ to cover the above fees is enclosed. b. [X] Please charge my Deposit Account No. <u>14-1270</u> in the amount of <u>\$1,170.00</u> to cover the above fees. A duplicate copy of this sheet is enclosed. c. [X] The Commissioner is hereby authorized to charge any additional fee, with the exception of the Base Issue Fee, which may be required, or credit any overpayment to Deposit Account No. <u>14-1270</u> . A duplicate copy of this sheet is enclosed.				
NOTE: Where an appropriate time limit under 37 C.F.R. 1.494 or 1.495 has not been met, a petition to revive (37 C.F.R. 1.137(a) or (b)) must be filed and granted to restore the application to pending status.				
SEND ALL CORRESPONDENCE TO:				
 (SIGNATURE) Michael E. Marion (NAME) 32,266 (REGISTRATION NUMBER)				

Network connection

The invention relates to a network connection comprising at least two wires for electrically connecting network users in a network.

Known network connections are constructed in such a way that they are suitable for data transmission through the two wires of the network connection. This has the 5 drawback that both terminals of an energy power supply for the network users are to be realized via separate electric connections.

It is an object of the invention to provide a network connection which is suitable for both data transmission and energy transfer.

According to the invention, this object is solved in that the network connection 10 has a symmetrical structure and the two wires are twisted, in that the wires are mutually insulated to such an extent that they are suitable for a symmetrical, differential data transmission, and in that the two wires have the same electrical resistance and jointly have a cross-section which is suitable for energy transfer from a terminal of a voltage source to network users via both wires.

15 In this network connection, data can be transmitted through the two wires. Moreover, the energy transfer can jointly take place through the two wires in that a terminal of a voltage source is coupled to the two wires so that energy transfer to the network users can take place through these wires.

For the energy transfer, the two wires jointly have such a cross-section that 20 they are suitable for the currents flowing in response to the energy transfer.

The data transmission is advantageously realized symmetrically and differentially. To this end, the two wires are mutually insulated. This insulation should only be sufficient for the relatively low data transmission voltages. It should particularly not be suitable for relatively high voltages of a power supply for the network users, because only 25 one pole of a voltage source is jointly coupled through the two wires.

Moreover, the two wires have the same electrical resistance in order that the symmetrical differential data transmission through the two wires has the same resistance. Moreover, the data transmission is thus not disturbed by the potential jumps which may occur as a result of the energy transfer.

The network connection has a symmetrical construction. This results in a high attenuation of disturbances of the power supply lines, which is achieved via a cancelling means ("Auslöschung").

To achieve a satisfactory decoupling with respect to external electric and 5 magnetic fields, the two wires are advantageously twisted. This results in an improved mutual magnetic coupling of the two wires, which contributes to the signal-to-noise ratio of the data transmission.

Since the load current for the energy supply is jointly passed through the two wires of the network connection, it is not desirable to use additional copper for this purpose.

10 The overall cross-section of the two wires must only be chosen to be as large as the cross-section of a wire of a separate cable connection for the energy transfer.

For the insulation between the two wires, a thin, inexpensive insulation is admissible because, on the one hand, only the low data transmission voltages are to be insulated and, on the other hand, only the communication rather than the energy supply drops out, even in the case of a failing insulation.

15 As described in an embodiment as defined in claim 2, only one of the wires may be provided with an insulation for this purpose.

Since the insulation can be formed in a relatively simple manner, a lacquer coating, a synthetic material coating or a tubing may be provided as insulations, as described 20 in further embodiments of the invention.

When stranded wires are used, they can be advantageously insulated by means of a cladding of one of the stranded wires or by means of an insulation between the two stranded wires, as described in a further embodiment of the invention as defined in claim 6.

25 The network connection according to the invention may also be in a double form, as defined in claim 7. A pole for the energy supply is then coupled via one of the network connections. The data transmission may be realized in a redundant form through the two network connections so that the transmission reliability is enhanced.

To simplify a contact of the network connection, for example, to a network 30 coupler, the outer insulation and the twisting of the wires may be advantageously formed as defined in claim 8.

The network connection according to the invention can be advantageously used in vehicles in which a pole for the power supply is coupled via the chassis of the vehicle. Then, both the data transmission and the power supply for the other pole can take

place via the network connection according to the invention. An additional cable connection with two wires for the power supply can then be dispensed with.

These and other aspects of the invention are apparent from and will be elucidated with reference to the embodiments described hereinafter.

5

In the drawings:

Fig. 1 shows a network comprising a plurality of network users, among which a network connection according to the invention is established,

10 Fig. 2 is a cross-section through a first embodiment of a network connection according to the invention, in which only one wire is insulated,

Fig. 3 is a cross-section through a second embodiment of a network connection according to the invention, in which both wires are provided with a thin lacquer coating, and

15 Fig. 4 is a cross-section through a third embodiment of a network connection according to the invention, in which the wires are formed as stranded wires.

DIVERGENT DEVELOPMENT

20 Fig. 1 shows a network connection according to the invention, with two wires 1 and 2. The network connection has a star-shaped configuration and interconnects a plurality of network users 3, 4, 5 and 6. A further network user 7 is provided which is coupled to a terminal of a voltage source U_B and couples this terminal into the two wires 1 and 2 of the network connection.

25 Via network couplers 8, the network users 3, 4, 5 and 6 are capable of coupling out the required energy symmetrically from the two wires 1 and 2 of the network connection. Furthermore, the network users 3, 4, 5 and 6 transmit data via the two wires 1 and 2 of the network connection according to the invention, which is coupled in and coupled out via the network couplers and is formed in such a way that the data are transmitted symmetrically and differentially through the two wires 1 and 2.

30 The other terminal of the voltage source U_B may be connected, for example, to the chassis of the vehicle comprising the network users 3 to 7.

The circuit diagram shown in Fig. 1 illustrates that an additional cable connection with two wires for the transfer of energy may be dispensed with in the network connection according to the invention. One terminal for the power supply is coupled via the

two wires 1 and 2 of the network connection according to the invention, and the other terminal is coupled via the chassis of the vehicle.

Due to the specific construction of the two wires 1 and 2 of the network connection according to the invention, which will be further described hereinafter, these 5 wires 1 and 2 are also simultaneously suitable for a symmetrical, differential data transmission.

This is particularly achieved in that the two wires 1 and 2 are symmetrical and the energy is transferred symmetrically through the two wires. Disturbances caused by the 10 energy transfer thus do not affect the data transmission, because the differential, symmetrical transmission cancels the disturbances during the evaluation of the data transmission.

The two wires 1 and 2 are mutually twisted so as to achieve a satisfactory decoupling from external electric magnetic fields. Moreover, the magnetic coupling between the two wires is thereby improved.

15 The mutual insulation of the two wires may be relatively simple and thin because this insulation should only insulate the relatively low data transmission voltages. Since a pole for the power supply is jointly coupled through the two wires, these relatively high currents or voltages do not require insulations between the wires.

20 Fig. 2 is a cross-section through a first embodiment 11 of a network connection according to the invention, with two wires 1 and 2. The two wires have the same cross-section and are electrically constructed in such a way that they have the same 25 resistance.

In the embodiment shown in Fig. 2, only one of the wires, namely the wire 1, is provided with a thin outer insulation 13. This insulation 13 may be, for example, an 25 insulating tubing or a lacquer coating. This insulation 13 should only be formed in such a way that it is adequate for the opposite data transmission voltages occurring in the two wires 1 and 2, which voltages are, however, relatively small.

Furthermore, a joint outer insulation 16 is provided.

The two wires 1 and 2 are mutually twisted in a way which is not further shown in Fig. 2.

30 To make optically optimal connection points, for example, for network couplers or the like visible in the network connection, the outer insulation 16 may be advantageously formed in such a way that the position of the two wires 1 and 2 in the network connection is visible, i.e. the twisting is recognizable from the exterior. Moreover,

the twisting of the two wires may be advantageously interrupted so as to provide optimal connection points on the two wires 1 and 2.

The cross-section through the first embodiment of the network connection according to the invention, as shown in Fig. 2, illustrates that both a data transmission and a terminal for a voltage source can be established via a network connection which is actually built up in a relatively simple manner, in which even the mutual insulation of the wires may be relatively simple.

This is also shown by a second embodiment shown also in a cross-section in Fig. 3 of a network connection according to the invention which also comprises two wires 1 and 2. However, in the second embodiment shown in Fig. 3, both wires 1 and 2 are provided with a thin outer insulation 21 and 22, respectively. For example, a thin lacquer coating which can be provided in a relatively easy way is sufficient for this purpose. Basically, this insulation may also consist of a synthetic material coating. It is alternatively possible to slide, for example, thin tubings on one or both wires 1 and 2.

15 The complete network connection is surrounded by an outer insulation 21.

Fig. 4 also shows, in a cross-section, an embodiment of a network connection according to the invention, in which the two wires 1 and 2 are constituted by stranded wires 32 and 33.

20 In Fig. 4A, the stranded wires 32 and 33 are mutually separated and insulated by means of an insulation 34. The complete stranded wires 32 and 33 are embedded in an insulation 35 so that they cannot move with respect to each other, and the insulation 34 ensures a safe insulation of the two stranded wires 32 and 33 forming part of the two wires 1 and 2.

25 Fig. 4B is similar to Fig. 4A, showing wires 1 and 2 constituted by stranded wires 32 and 33. However, in this case, not only an insulation 34 as in Fig. 4A is provided but also a cladding for one of the stranded wires. In the embodiment shown in Fig. 4B, the stranded wires 33 of the second wire 2 are completely insulated from the exterior by this cladding 36. Here again, the two stranded wires 32 and 33 are embedded in an outer insulation 35.

30 All embodiments shown in the Figures show that the network connection according to the invention may have a relatively simple structure because only a simple insulation between the wires 1 and 2 is required. Nevertheless, it is suitable for data transmission as well as for energy transfer.

CLAIMS:

1. A network connection comprising at least two wires (1, 2) for electrically connecting network users (3, 4, 5, 6, 7) in a network, characterized in that the network connection has a symmetrical structure and the two wires (1, 2) are twisted, in that the wires (1, 2) are mutually insulated to such an extent (13; 21, 22; 34; 35) that they are suitable for a symmetrical, differential data transmission, and in that the two wires (1, 2) have the same electrical resistance and jointly have a cross-section which is suitable for energy transfer from a terminal of a voltage source to network users (3, 4, 5, 6) via both wires (1, 2).

5

2. A network connection as claimed in claim 1, characterized in that only one wire (1; 2) in the network connection is provided with an insulation (13; 21).

10

3. A network connection as claimed in claim 2, characterized in that only one of the wires (1; 2) in the network connection is provided with a lacquer coating (21) used as an insulation.

15

4. A network connection as claimed in claim 2, characterized in that only of the wires (1; 2) in the network connection is provided with a synthetic material coating (13) used as an insulation.

20

5. A network connection as claimed in claim 2, characterized in that only one of the wires (1; 2) in the network connection is surrounded by a tubing used as an insulation.

6. A network connection as claimed in claim 1, characterized in that the wires (1, 2) in the network connection are formed as stranded wires (32, 33), and in that said stranded wires (32, 33) are mutually insulated by means of an insulation (34) or a cladding (36) of one of the stranded wires (32; 33).

25

7. A network connection as claimed in claim 1, characterized in that the network connection with two wires (1, 2) each has a double form, and in that the two network connections are twisted.

5 8. A network connection as claimed in claim 1, characterized in that the outer insulation (16; 25; 35) of the network connection is formed in such a way that the position of the two wires (1, 2) in the network connection is visible and in that the twisting of the two wires (1, 2) is interrupted.

10 9. Use of a twisted double cable as a network connection in a network, in which both a symmetrical, differential data transmission via the two wires (1, 2) and an energy transfer from a terminal of a voltage source via the two wires (1, 2) of the network connection is realized.

15 10. Use of a cable having at least two wires (1, 2) for electrically connecting network users (3, 4, 5, 6, 7) in a network, wherein the network connection has a symmetrical structure and the two wires (1, 2) are twisted, the wires (1, 2) being mutually insulated to such an extent (13; 21, 22; 34; 35) that they are suitable for a symmetrical, differential data transmission, the two wires (1, 2) having the same electrical resistance and jointly having a cross-section which is suitable for energy transfer from a terminal of a voltage source to network users (3, 4, 5, 6) via both wires (1, 2).

20 11. Use of a network connection as claimed in any one of claims 1 to 8, wherein the positive terminal is coupled to the network users via the network connection, and wherein 25 the negative terminal of the voltage source is coupled to the network users via the chassis of the vehicle.

ABSTRACT:

In a network connection comprising at least two wires (1, 2) for electrically connecting network users (3, 4, 5, 6, 7) in a network, joint data transmission and energy transfer from a terminal of a voltage source via the two wires of the network connection is ensured in that the network connection has a symmetrical structure and the two wires (1, 2) are twisted, in that the wires (1, 2) are mutually insulated to such an extent (13; 21, 22; 34; 35) that they are suitable for a symmetrical, differential data transmission, and in that the two wires (1, 2) have the same electrical resistance and jointly have a cross-section which is suitable for energy transfer from a terminal of a voltage source to network users (3, 4, 5, 6) via both wires (1, 2).

10

Fig. 2

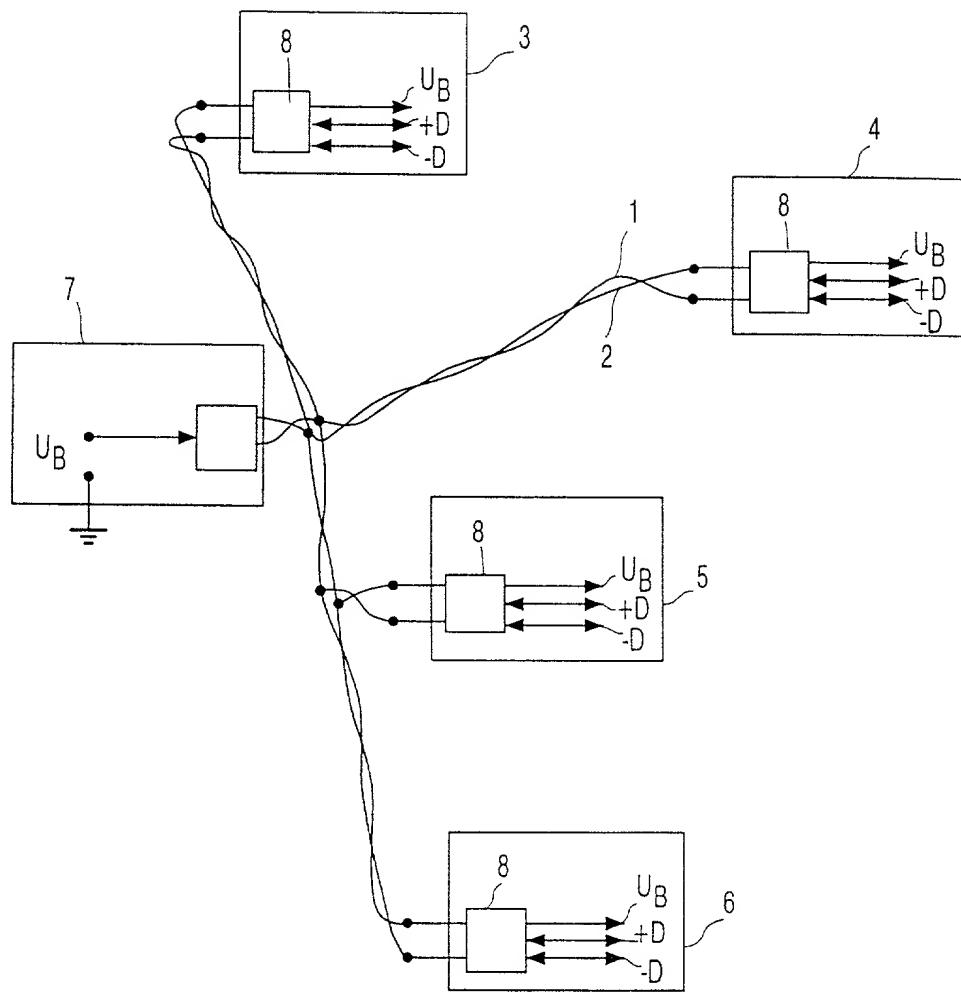


FIG. 1

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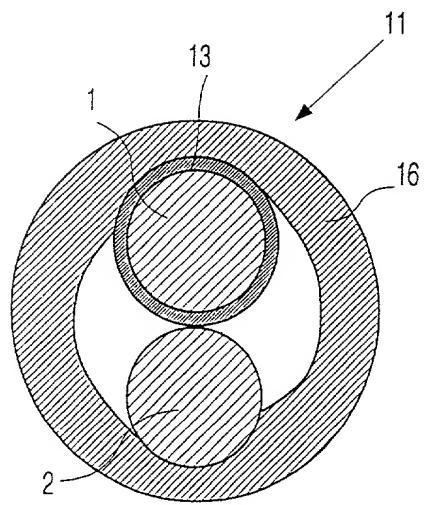


FIG. 2

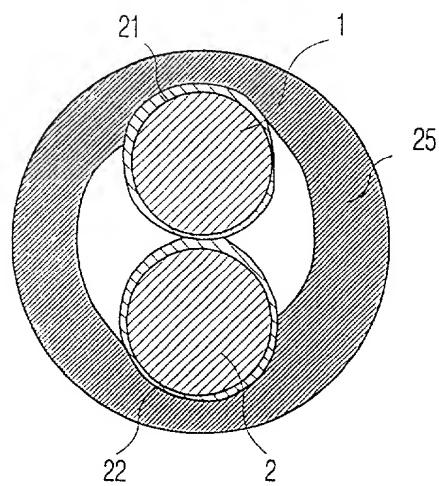


FIG. 3

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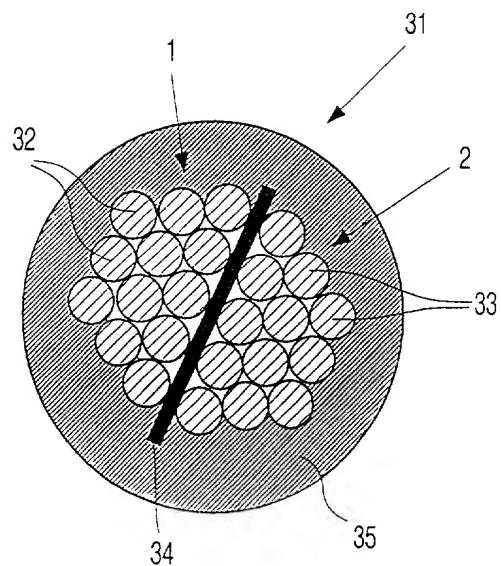


FIG. 4A

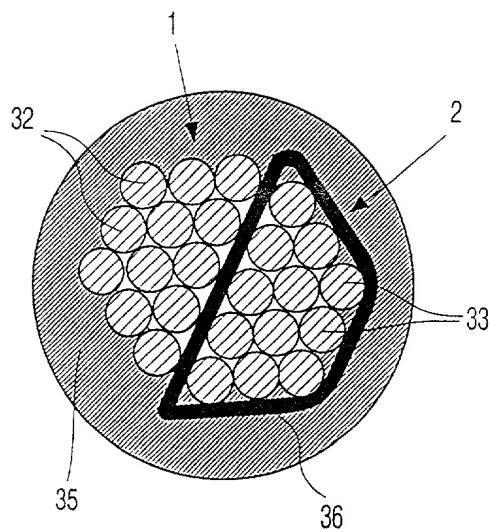


FIG. 4B

COMBINED DECLARATION FOR PATENT APPLICATION AND POWER OF ATTORNEY
(includes Reference to PCT International Applications)

ATTORNEY'S DOCKET
NUMBER
PHDE000004 US

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled: "**Network connection**"

the specification of which (check only one item below):

is attached hereto.

was filed as United States application

Serial No _____

on _____

and was amended

on _____

was filed as PCT international application

Number PCT/EP00/09197

On 18 September 2000

and was amended under PCT Article 19

on _____ (if applicable).

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations, § 1.56(a).

I hereby claim foreign priority benefits under Title 35, United States Code, § 119 of any foreign application(s) for patent or inventor's certificate or of any PCT international application(s) designating at least one country other than the United States of America listed below and have identified below any foreign application(s) for patent or inventor's certificate or any PCT international application(s) designating at least one country other than the United States of America filed by me on the same subject matter having a filing date before that of the application(s) of which priority is claimed:

PRIOR FOREIGN/PCT APPLICATION(S) AND ANY PRIORITY CLAIMS UNDER 35 U.S.C. 119:

COUNTRY	APPLICATION NUMBER	DATE OF FILING DAY, MONTH, YEAR	PRIORITY CLAIMED UNDER 35 USC 119
Germany	19944697.0	18 September 1999	YES
Germany	10002227.8	20 January 2000	YES

Combined Declaration For Patent Application and Power of Attorney (Continued)
(includes Reference to PCT International Applications)

Attorneys Docket Number
PHDE000004 US

POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorney(s) abnd/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith. (List name and registration number)

3
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I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

SIGNATURE OF INVENTOR 201	SIGNATURE OF INVENTOR 202	SIGNATURE OF INVENTOR 203
<u>Matthias Wendt</u>	<u>Wolfgang Budde</u>	<u>Peter Fuhrmann</u>
DATE 12 April 2001	DATE 12 April 2001	DATE 12 April 2001

U.S. DEPARTMENT OF COMMERCE- Patent and Trademarks Office

(July 1994)